

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Amendment of the Commission’s Rules to)	WT Docket No. 19-140
Promote Aviation Safety)	
)	
WiMAX Forum Petition to Adopt Service Rules)	RM-11793
for the Aeronautical Mobile Airport)	
Communications System (AeroMACS))	
)	
Petition of Sierra Nevada Corporation for)	RM-11799
Amendment of the Commission’s Rules to)	
Allow for Enhanced Flight Vision System Radar)	
under Part 87)	
)	
Petition of Aviation Spectrum Resources, Inc.)	RM-11818
for Amendment of Sections 87.173(b) and)	
87.263(a) of the FCC’s Rules to Allow Use of)	
the Lower 136 MHz Band by Aeronautical)	
Enroute Stations)	
)	
Petition of Airports Council International-North)	RM-11832
America Regarding Aeronautical Utility Mobile)	
Stations)	

COMMENTS OF SPIRE GLOBAL, INC.

I. INTRODUCTION.

Spire Global, Inc. (“Spire”)¹ respectfully submits these comments in response to the Federal Communications Commission’s (“Commission’s” or “FCC’s”) Notice of Proposed

¹ Spire is a space-to-cloud analytics company that utilizes proprietary satellite data and algorithms to provide the most advanced maritime, aviation, and weather tracking in the world. Spire’s data analytics is backed by a wholly-owned and developed constellation of nanosatellites, global ground station network, and 24/7 operations that provide real-time global coverage of every point on Earth. To learn more, visit www.spire.com.

Rulemaking in the above-captioned proceedings.² The *NPRM* invites comments on how the Commission can ensure spectrum allocations “accommodate the most current technologies to promote aviation safety and efficiency.”³

Today more than ever the FCC must swiftly accommodate communication technologies that track and provide weather data to airplanes and unmanned aircraft vehicles (“UAS”). From 2017 to 2018, nearly 4 billion people, more than half the world’s population, travelled over a network of 22,000 routes, a year-over-year increase of 1300 new city pairs.⁴ By 2023, 835,000 non-model, small UAS⁵ will be providing internet connectivity, delivering medicine in remote areas or packages in densely populated areas, and supporting law enforcement operations, among many other services.⁶ In a forthcoming proceeding, the Commission should allocate space-based Automatic Dependent Surveillance-Broadcast (“ADS-B”) reception, for airplane and UAS tracking, and Flight Information Services – Broadcast (“FIS-B”) transmissions, for weather data delivery to airplanes. Such actions will avert the grounding of the ever-increasing number of flights and innovative aviation technologies, keep flights safe, and improve route/fuel efficiencies.

² See *Amendment of the Commission’s Rules to Promote Aviation Safety*, Notice of Proposed Rulemaking, WT Docket No. 19-140 *et al.* (rel. Jun. 7, 2019) (“*NPRM*”).

³ See *id.* ¶ 56.

⁴ See *Annual Review 2019*, IATA (Jun. 1, 2019), <https://www.iata.org/publications/Documents/iata-annual-review-2019.pdf>.

⁵ See *FAA Aerospace Forecast Fiscal Years 2019-2039*, FAA at 46, https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2019-39_FAA_Aerospace_Forecast.pdf (last viewed Aug. 22, 2019) (“*FAA Aerospace Forecast*”). Around 1.39 million model small UAS units may be flying by 2023. See *id.* at 43.

⁶ See *38 Ways Drones Will Impact Society: From Fighting War To Forecasting Weather, UAVs Change Everything*, CB Insights (Jan. 24, 2019), <https://www.cbinsights.com/research/drone-impact-society-uav/>.

II. THE COMMISSION SHOULD CREATE A SPACE-BASED ADS-B RECEPTION FREQUENCY ALLOCATION.

Current terrestrial-based tracking of aircraft remains insufficient because systems do not monitor aircraft over remote, oceanic, and polar air routes.⁷ 1090 MHz ADS-B beacons continuously emit location, velocity, altitude, and heading information. However, ground-based systems do not track these beacons over oceans, for example, which is how Malaysia Airlines Flight 370 vanished completely with 239 passengers onboard.⁸ Terrain impediments, urban clutter, and a lack of cellular/internet connectivity also further inhibit the necessary tracking of the beacons while they transit. To solve this issue, the International Telecommunication Union WRC-15 (“WRC-15”) allocated spectrum for space-based reception of ADS-B signals in 1090 MHz.⁹ There is bipartisan Commission support to commence a rulemaking implementing the WRC-15 outcome within six months of this proceeding.¹⁰ Spire unequivocally and enthusiastically supports this action. Satellites, such as Spire’s, blanket the Earth and possess no

⁷ Every day, between two and three thousand aircraft fly across the Atlantic Ocean, including the polar regions. See Jim Brunton, *North Atlantic Skies – The gateway to Europe*, NATS (Jun. 26, 2014), <https://nats.aero/blog/2014/06/north-atlantic-skies-gateway-europe/>.

⁸ See Amy B. Wang, *Years after Flight 370 disappearance, Malaysia Airlines agrees to track its planes from space*, Washington Post (Apr. 20, 2017), <https://www.washingtonpost.com/news/innovations/wp/2017/04/20/years-after-flight-370-disappearance-malaysia-airlines-agrees-to-track-its-planes-from-space/>; see also Federal Aviation Administration, Advisory Circular: Automatic Dependent Surveillance-Broadcast Operations, FAA AC 90-114A with Change 1, at para. 2-2.c (2014) (AC 90-114A), https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_90-114A_CHG_1.pdf. Virtually all aircraft will need transmitting ADS-B beacons by January 2020.

⁹ See NPRM ¶ 24.

¹⁰ See NPRM at 42-43 (Statement of Commissioner Jessica Rosenworcel) (“At my request, [the NPRM] now also includes a discussion about the possibilities for space-based ADS-B. I think they’re big. So I want to thank my colleagues for agreeing to this discussion. Likewise, I want to thank the Chairman for agreeing to my request to start a proceeding within six months to implement the WRC outcome from 2015.”).

blind spots. Therefore, allocating space-based reception of ADS-B signals in 1090 MHz permits a cost-effective and ubiquitous solution for tracking all aircraft all the time, maintaining air safety and improving route/fuel efficiencies.

III. THE COMMISSION SHOULD ALLOCATE AN ADDITIONAL FREQUENCY FOR SPACE-BASED TRACKING OF UAS.

The Commission should also consider allocating a frequency within 960-1164 MHz for beyond-visual-line-of-sight space-based UAS tracking. Around 835,000 non-model and 1.39 million model small UAS will be flying in the United States by 2023.¹¹ The same impediments preventing adequate terrestrial-based airplane tracking will also disrupt terrestrial-based UAS tracking. Even worse, there are no pilots onboard the UAS to take potential correctional measures. So, a spectrum allocation for beyond-visual-line-of-sight space-based tracking of UAS is a must for maintaining air safety and improving route/fuel efficiencies.

IV. THE COMMISSION SHOULD CREATE A SPACE-BASED FIS-B TRANSMISSIONS FREQUENCY ALLOCATION.

Weather accounts for roughly 25% of aviation accidents in the United States;¹² however, the timely provision of accurate, critical weather data, which could prevent such accidents, still remains uncommon. Ground-based stations deliver meteorological data, via 978 MHz, directly to pilots in aircraft cockpits.¹³ Yet, the ability to circumnavigate based on up-to-date and accurate weather data remains limited because aircraft over remote, oceanic, and polar air routes

¹¹ See *FAA Aerospace Forecast* at 43, 46.

¹² See Andrew J. Fultz and Walker S. Ashley, *Fatal weather-related general aviation accidents in the United States*, *Physical Geography* at 1, 6 (Jul. 25, 2016), <http://chubasco.niu.edu/pubs/Fultz%20and%20Ashley%202016.pdf> (highlighting weather contributed to nearly 35% of aviation accidents from 1982-2013 in the United States).

¹³ See *Aeronautical Information Manual Official Guide to Basic Flight Information and ATC Procedures*, Federal Aviation Administration at 4-5-19 – 4-5-21 (Oct. 12, 2017), https://www.faa.gov/air_traffic/publications/media/aim.pdf.

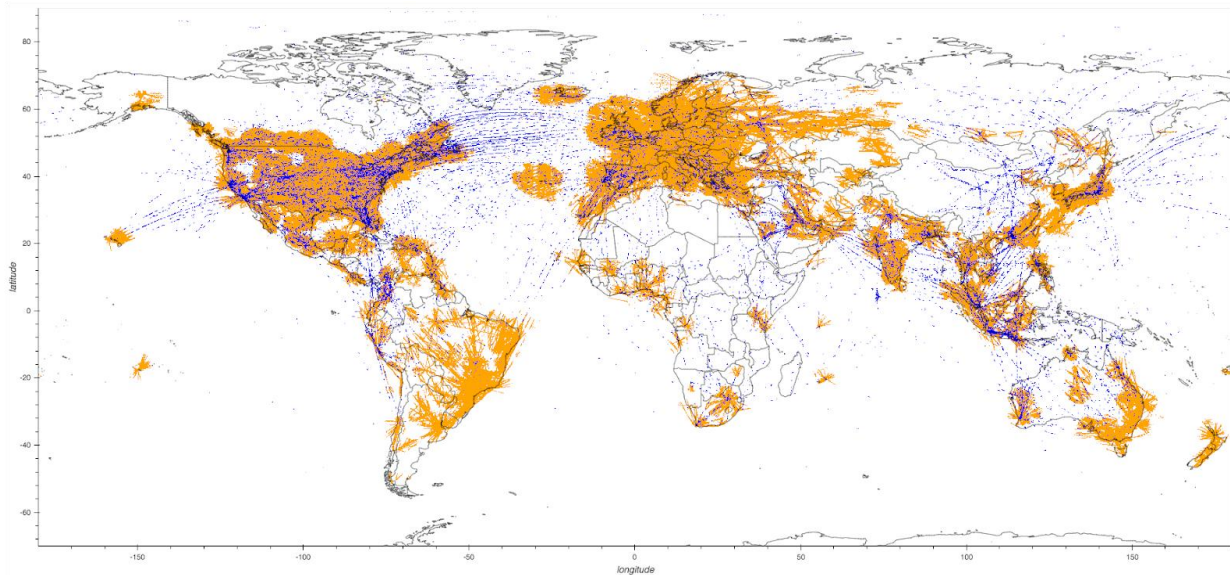
do not receive this FIS-B data from ground-based systems in a timely fashion. Again, satellites, such as Spire's, ensure constant global coverage, so space-based FIS-B presents itself as the cost-effective and ubiquitous solution for delivering accurate weather data in a timely manner to all aircraft, maintaining air safety and improving route/fuel efficiencies.

V. SPIRE OPERATES A ROBUST AND RAPIDLY GROWING SPACE-BASED SYSTEM CAPABLE OF TRACKING AND PROVIDING CRITICAL WEATHER DATA TO ALL AIRCRAFT.

Spire already possesses space-based infrastructure that can track all aircraft and, in the future, timely provide weather data to all aircraft. The company operates eighty-four (84) satellites on orbit,¹⁴ and they are authorized to receive airborne ADS-B signals on a waiver basis.¹⁵ With the satellites' low operating altitude and deployments across different orbital inclinations and Spire's global ground station network and potential future use of inter-satellite links, Spire can significantly increase the number of available aircraft position reports it processes and also decrease the latency when receiving these reports.

¹⁴ Spire plans to operate a 175-satellite constellation.

¹⁵ See, e.g., Stamp Grant, Spire, IBFS File No. SAT-AMD-20180102-00001 (granted in part Nov. 29, 2018); Stamp Grant, Spire, IBFS File No. SAT-AMD-20161114-00107 (granted in part Jul. 13, 2017).



Source: Spire ADS-B Coverage Map (August 2019).

Spire's constellation will also deliver 100,000 weather profiles daily, providing key inputs into the world's weather models. Aircraft can receive Spire weather data from Spire satellites through FIS-B transmissions to improve route/fuel efficiencies and circumvent rough weather and other phenomena such as volcanic ash and dust cloud eruptions, which cause wear on engines and propellers and impair cockpit visibility.¹⁶

¹⁶ See, e.g., Thomas Gerz, *Mitigating the impact of weather hazards on aviation*, DLR, https://www.wmo.int/pages/prog/arep/wwrp/new/wwosc/documents/140821_WWOSC-Montreal-kurz.pdf (last viewed Aug. 21, 2019); *Volcanic Ash Impacts & Mitigation*, United States Geological Survey, https://volcanoes.usgs.gov/volcanic_ash/ash_clouds_air_routes_effects_on_aircraft.html (last modified Dec. 14, 2015).

VI. CONCLUSION.

For all of the reasons stated above, Spire requests that the Commission take actions consistent with these comments.

Respectfully submitted,

By: /s/ *Ananda Martin*

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